

TABLE 6. TAX EFFECTS OF THE ORIGINAL
TREASURY TAX PROPOSAL

Category	Current Law	Treasury Proposal	Absolute Change	Percentage Change
Property No. 1				
Major				
Taxes (present value)(\$000)	425.6	1096.1	670.5	157.5
Pretax return	13.1	15.3	2.2	16.8
Effective tax rate	12.1	28.5	16.4	135.5
Equivalent price	26.00	23.05	-2.95	-11.3
Independent				
Taxes (present value)(\$000)	-117.5	1096.1	1213.6	*
Pretax return	11.7	15.3	3.6	30.8
Effective tax rate	-3.6	28.5	32.1	*
Equivalent price	26.00	20.89	-5.11	-19.7
Property No. 2				
Major				
Taxes (present value)(\$000)	659.6	373.4	-286.2	-43.4
Pretax return	18.0	15.0	-3.0	-16.7
Effective tax rate	42.3	27.0	-3.0	-16.7
Equivalent price	26.00	30.54	+4.54	+17.5
Independent				
Taxes (present value)(\$000)	463.8	373.4	-90.4	-19.5
Pretax return	15.9	15.0	-0.9	-5.7
Effective tax rate	32.3	27.0	-5.3	-16.4
Equivalent price	26.00	27.34	+1.34	+5.2
Property No. 2 a/				
Major				
Taxes (present value)(\$000)	336.6	373.4	36.8	10.9
Pretax return	14.7	15.0	0.3	2.0
Effective tax rate	24.8	27.0	2.2	8.9
Equivalent price	26.00	25.66	-0.34	-1.3
Independent				
Taxes (present value)(\$000)	175.6	373.4	197.8	112.6
Pretax return	13.3	15.0	1.7	12.8
Effective tax rate	14.0	27.0	13.0	92.9
Equivalent price	26.00	24.20	-1.80	-6.9
Property No. 3				
Major				
Taxes (present value)(\$000)	350.0	743.4	393.4	112.4
Pretax return	12.9	14.1	1.2	9.3
Effective tax rate	10.3	20.8	10.5	101.9
Equivalent price	26.00	24.07	-1.93	-7.4
Independent				
Taxes (present value)(\$000)	-128.0	743.4	871.4	*
Pretax return	11.7	14.1	2.4	20.5
Effective tax rate	-4.1	20.8	24.9	*
Equivalent price	26.00	22.03	-3.97	-15.3

* Not applicable.

a. Same as Property No. 2, except that it is considered newly discovered oil instead of tier one (old) oil.

because the base price is above the market price.) The effective tax rates if property 2 is considered new oil instead of tier one oil are 25 percent for the integrated producer and 14 percent for the independent.

The results of the DCF model simulations for the same three properties under the Treasury tax proposal are shown in the second column. The provisions of the Treasury's tax proposal would increase the effective tax rate on two of the properties (1 and 3), but decrease it on property 2. The effective tax rates on the three properties are 29 percent, 27 percent, and 21 percent, respectively. These rates apply to both integrated and independent companies because the tax distinctions between independent companies and integrated companies would be eliminated. The higher tax rates reflect the requirements that drilling costs for productive wells be capitalized, that drilling costs for non-productive wells not be written off until a property is abandoned, and that no deduction be allowed for percentage depletion. All investment costs (except for depreciable assets) related to producing properties would be capitalized and recovered through cost depletion. The basis of the property would be indexed for inflation so that cost depletion deductions would automatically maintain their real value.

The lower tax on the second property for the integrated company is the result of the repeal of the windfall profit tax under the Treasury proposal. In the long run, the windfall profit tax is scheduled to expire so that the reduced taxes from this effect are only temporary. If this property is considered new oil for purposes of the windfall profit tax, the Treasury proposal raises the effective tax rate on it also.

The equivalent oil price calculations (for the integrated company) show that the Treasury proposal would have the same effect as lowering the price of oil from \$26.00 per barrel to \$23.05 on property one--a reduction of \$2.95 per barrel.^{50/} There is a price increase for property 2 of \$4.54 per barrel, and a price decrease of \$1.93 for property 3.^{51/} The equivalent price reductions are larger for the independent company. They are -\$5.11 per barrel on property 1 and -\$3.97 per barrel on property 3. Property 2's price increase is also smaller (\$1.34 versus \$4.54). These changes show that Treasury I would have a more

50. This is the initial price. It is assumed that the price is decreased proportionately over all future periods.

51. The equivalent price increase on the second property reflects the proposed repeal of the windfall profit tax. If this property is considered new oil, there is an equivalent price reduction of \$0.34.

severe effect on small independent companies than on larger producers.

The President's Plan. The results from simulating the President's tax plan are shown in Table 7. The effective tax rates are lower for the integrated company for all three properties than under current law, but higher for the independents. For the integrated company, the tax rate on property 1 falls from 12 percent to 9 percent; on property 2 it falls from 42 percent to 40 percent; on property 3, it falls from 10 percent to 6 percent. The high tax rate on property 2 remains because the President's plan, unlike Treasury I, would not accelerate the elimination of the windfall profit tax.^{52/} The lower tax rates on the integrated company are the result of the reduction in the statutory tax rate from 46 to 33 percent, and of the allowance for indexed cost depletion instead of historical cost depletion. These advantages are partially offset by the elimination of the investment tax credit.

The higher tax rates on the independent company are primarily the result of the almost complete repeal of percentage depletion. (The independent company is assumed to be eligible for percentage depletion in the later years of each property's life once production declines to stripper levels.) They are also affected by the repeal of the investment tax credit. In general, the tax rates on the independent and the integrated company would become much closer together under the President's plan, but not as close as under Treasury I. The only basic differences that would remain would be the allowance of percentage depletion for stripper oil produced by independents and retention of the 20 percent amortization requirement for intangible drilling costs for integrated companies. Also, to the extent that the two different types of companies remain subject to the windfall profit tax, independent companies will continue to enjoy the benefits of reduced rates for their production.

The President's tax plan is likely to have only a small effect on the prospective profitability of future investments in oil and gas compared to current law. For integrated companies there is likely to be a tax reduction, making some currently uneconomic ventures profitable. This should have positive effects on investment in the domestic petroleum industry. On the other hand, the limitation on the allowance for percentage depletion should reduce the attractiveness of investments undertaken by

52. If property 2 was considered new oil, the tax rate for the integrated company would fall from 25 percent to 18 percent.

TABLE 7. TAX EFFECTS OF THE PRESIDENT'S TAX PROPOSAL

Category	Current Law	President's Proposal	Absolute Change	Percentage Change
Property No. 1				
Major				
Taxes (present value)(\$000)	425.6	318.3	-107.3	-25.2
Pretax return	13.1	12.8	-0.3	-2.3
Effective tax rate	12.1	9.2	-2.9	-24.0
Equivalent price	26.00	26.47	+0.47	+1.8
Independent				
Taxes (present value)(\$000)	-117.5	255.5	373.0	*
Pretax return	11.7	12.7	1.0	8.5
Effective tax rate	-3.6	7.5	11.1	*
Equivalent price	26.00	24.42	-1.58	-6.1
Property No. 2				
Major				
Taxes (present value)(\$000)	659.6	600.9	-58.7	-8.9
Pretax return	18.0	17.4	-0.6	-3.3
Effective tax rate	42.3	39.5	-2.8	-6.6
Equivalent price	26.00	26.92	+0.92	+3.5
Independent				
Taxes (present value)	463.8	537.2	73.4	15.8
Pretax return	15.9	16.7	0.8	5.0
Effective tax rate	32.3	36.2	3.9	12.1
Equivalent price	26.00	24.90	-1.10	-4.2
Property No. 2 a/				
Major				
Taxes (present value)(\$000)	336.6	227.0	-109.6	-32.6
Pretax return	14.7	13.7	-1.0	-6.8
Effective tax rate	24.8	17.6	-7.2	-29.0
Equivalent price	26.00	26.47	+0.97	+3.7
Independent				
Taxes (present value)(\$000)	175.6	191.7	16.1	9.2
Pretax return	13.3	13.5	0.2	1.5
Effective tax rate	14.0	15.1	1.1	7.9
Equivalent price	26.00	25.85	-0.15	-0.6
Property No. 3				
Major				
Taxes (present value)(\$000)	350.0	207.8	-142.2	-40.6
Pretax return	12.9	-12.6	-0.3	-2.3
Effective tax rate	10.3	6.3	-4.0	-38.8
Equivalent price	26.00	26.69	+0.69	+2.7
Independent				
Taxes (present value)(\$000)	-128.0	168.5	296.5	*
Pretax return	11.7	12.4	0.7	6.0
Effective tax rate	-4.1	5.1	9.2	*
Equivalent price	26.00	24.65	-1.35	-5.2

* Not applicable.

a. Same as Property No. 2, except that it is considered newly discovered oil instead of tier one (old) oil.

small independent companies.^{53/} Some properties that independents would find profitable under current law may no longer be worth the investment under the President's proposal. The overall change in output depends on the relative sizes of the positive effect on investment by integrated firms versus the negative effect on investment by independent companies.

The equivalent oil price calculations show that the President's proposal would have the same effect as raising the price of oil (for integrated companies) from \$26.00 per barrel to \$26.47 on property 1--an increase of \$0.47 per barrel. The price increase for property 2 is \$0.92 per barrel, and for property 3 \$0.69. On the other hand, the equivalent oil price falls for independent companies because of the loss of percentage depletion. The equivalent price reductions for the independent company are -\$1.58 for property 1, -\$1.10 for property 2, and -\$1.35 for property 3. Overall, these changes are relatively small and should have only a minor effect on domestic drilling and production.^{54/}

COST OF CAPITAL MODEL

The second mode of analysis used in this study is the "cost-of-capital" approach. This approach analyzes the oil extraction industry from an aggregate viewpoint and calculates overall tax effects. The same general methodology is also used to calculate the cost of capital and effective tax rates on other industries, compared to those in the oil and gas industry. This is important because the tax reform proposals affect all industries, not just the oil and gas industry.

The full effect of a tax reform proposal should be viewed in the broad context of how it affects the industry's taxation relative to other industries. In other words, is the oil and gas industry hurt more by the proposal than other industries? The reason this is an important question is that capital markets (that is, savers and investors) are primarily concerned with the relative after-tax profitability of alternative investments. If a

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53. Even though some large independents lose the benefit of percentage depletion, this may not affect their marginal investment decisions because they are ineligible for that allowance on production over their first 1,000 barrels per day.
54. These conclusions are broadly consistent with those reported in Department of Energy, Energy Information Administration, Analysis of the Impacts of the President's Tax Proposal on Major Sectors of the Energy Industry (August 1985).

tax reform proposal alters the current distribution of after-tax returns, investors will tend to shift their funds toward those sectors that are relatively favored.^{55/} Those industries that are relatively favored (or merely less "hurt") by a tax change will benefit because their cost of capital will be reduced as investors shift funds into these industries, thereby lowering their required after-tax returns. An industry's cost of capital may fall even if the tax on the industry itself is increased.

THE COST OF CAPITAL APPROACH

The tax system affects the demand by businesses for different kinds of assets by changing the relative user costs of forms of capital. The user cost of capital is generally defined as the cost to a firm of employing a unit of capital for one period. It is equivalent to what a firm would have to pay to lease the same unit, assuming perfectly competitive markets. Hence, the terms "user cost" and "rental cost" are often used interchangeably. In equilibrium, the user cost of an asset will also equal the marginal revenue it produces, since otherwise firms would have an incentive to shift the level or composition of their capital stock.^{56/} The user cost includes three factors: the amount of capital consumed (or economic depreciation), taxes, and a net after-tax return paid to investors.

In the absence of taxes, the real user cost of capital (C) equals the sum of economic depreciation (d) and the competitive

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55. To the extent that savers and (in the aggregate) investors provide a lower amount of financial capital because of an increase in taxes on capital income, the overall level of new investment could shrink. At present, however, there is no consensus on how sensitive the rate of national saving is to changes in the effective tax rate on capital income. Some economists argue that saving is very sensitive to changes in capital taxation; others argue that there may be no effect at all.
56. If an asset's revenue is less than its user cost, the asset is unprofitable and will not be acquired. Conversely, if its revenue is more than its user cost, firms will buy more of the asset. An equilibrium is reached when revenue equals cost and firms have no incentive to alter their capital stock.

rate of return (r) multiplied by the asset's acquisition cost (q).^{57/} That is:

$$C = q(r + d)$$

where

q	=	asset acquisition cost
r	=	real rate of return
d	=	rate of depreciation of output

Note that depreciation in this case is the exact amount that the firm needs to recover in order to leave its total capital intact. This equation is based on an asset whose productivity is assumed to decline at a constant rate over time. By setting the cost of the asset (q) equal to one, the user cost of capital, per unit of capital, is equal to the sum of the real return and economic depreciation. That is, $C = r + d$.

When taxes are imposed on the income from capital, the cost of capital rises to cover the taxes, as well as to cover the return to investors and depreciation.^{58/} Under the assumption that investors require a fixed real rate of return after tax of r^* , the user cost of capital (per unit of capital) is equal to:

$$C = (r^* + d)(1 - uz - k)/(1 - u)$$

where

r^*	=	required real after-tax rate of return (real discount rate)
z	=	present value of depreciation allowances (discounted at the nominal post-tax interest rate)
k	=	investment tax credit rate
u	=	corporate tax rate

In this equation, the present value of depreciation allowances (z) refers to those allowed by the tax code. It also includes items such as tax depletion, amortization, or any other form of deduction allowed for recovery of capital expenditures. From this equation, it is apparent that the user cost of capital is lowered

57. See Jane G. Gravelle, "Effects of the 1981 Depreciation Revisions on the Taxation of Income From Business Capital," National Tax Journal (March 1982), pp. 1-20, for a derivation of the user cost of capital and effective tax rate equations.

58. If instead it is assumed that pretax returns remained fixed, and the after-tax return declines in response to the imposition of the tax, the user cost of capital remains unchanged. In this case, the suppliers of capital (savers) bear the full cost of the tax through a reduced after-tax rate of return. (This alternative assumes that the supply of capital to the industry is perfectly inelastic.)

by increases in the present value of capital recovery allowances or the investment tax credit rate (k), and rises if the tax rate (u) is increased. (For purposes of this analysis, the only tax considered is the corporate income tax. In other words, r^* reflects the return that investors require after the corporate tax, but before individual income taxes.)

Suppose the tax law allows firms to deduct actual (or economic) depreciation indexed for inflation. This allows firms to keep their real capital intact, without providing any investment subsidy. Also assume that no investment credit is allowed. In this case, the user cost per unit of capital is simply:

$$C = (r^*/(1 - u)) + d$$

The user cost is equal to the pretax rate of return plus depreciation. Note that the pretax rate of return ($r^*/(1 - u)$) equals the required after-tax rate of return (r^*) increased by the amount of income taxes.

Effective Marginal Tax Rates. In general, the effective marginal tax rate for an asset is calculated by the ratio:

$$TR = (r - r^*)/r$$

where

TR	=	asset tax rate
r	=	pretax rate of return
r*	=	required after-tax rate of return

It is the difference between the pretax and after-tax rates of return, divided by the pretax rate of return. The required after-tax rate of return is the return that the corporation must earn over the life of the asset in order to undertake the investment. (This assumes that the corporation has other investment opportunities from which it can earn as much as r^* .) In equilibrium, r is the pretax rate of return that yields r^* after tax. It should be stressed that the effective tax rate derived by this method is the theoretical tax rate that would result under a certain set of assumptions; these include assumptions of depreciation, inflation, and interest rates, as well as an assumption that all deductions and credits can be fully utilized on a current basis. This same general mathematical formulation has been used in several studies to estimate effective marginal corporate tax rates.^{59/} This model, like the DCF model, only takes account of

59. See Alan J. Auerbach, "Corporate Taxation in the United States," Brookings Papers on Economic Activity 1983: 2 (Washington, D.C.: The Brookings Institution, 1984), pp. 451-514; Jane G. Gravelle, "Effects of the 1981 Depreciation Revisions on the Taxation of Income From Business Capital,"

corporate-level taxes; personal taxes on dividends, interest, and capital gains are excluded.

The rate of return r that yields r^* after tax is defined by:

$$r = \frac{(r^* + d)(1 - uz - k) - d}{(1 - u)}$$

where

r	=	Pretax rate of return
r^*	=	Required after-tax rate of return
d	=	Economic depreciation rate
k	=	Investment tax credit rate
u	=	Statutory tax rate
z	=	Present value of tax depreciation deductions (discounted at the nominal after-tax interest rate)

Using this formula yields an effective tax rate equal to the statutory tax rate when economic depreciation or depletion (indexed for inflation) is allowed (and the investment credit is disallowed). As either the investment credit or the present value of depreciation allowances rises, the effective tax rate falls. This is important because the more accelerated depreciation allowances are allowed for tax purposes, the lower is the effective tax rate.

The tax rate on each industry reflects a weighted average of the tax rates on most fixed assets in its capital stock. (This includes depreciable assets and inventories, but not other assets, such as patent rights, good will, or working capital.) For the oil and gas industry it is assumed that the initial capital stock consists of 69 percent intangible drilling costs, 20 percent mineral acquisition and geological costs (depletable costs), and 11 percent lease (depreciable) equipment.^{60/} Of the drilling costs, 30 percent are assumed to be for dry wells, the remaining 70 percent are for producing wells. Forty percent of

National Tax Journal (March 1982), pp. 1-20; Charles R. Hulten and James W. Robertson, Corporate Tax Policy and Economic Growth: An Analysis of the 1981 and 1982 Tax Acts, Urban Institute Discussion Paper (December 1982); and Mervyn A. King and Don Fullerton, The Taxation of Income From Capital: A Comparative Study of the United States, United Kingdom, Sweden, and West Germany (Chicago: University of Chicago Press, 1984).

60. These ratios are based on data reported in Bureau of the Census, Annual Survey of Oil and Gas, 1982 (March 1984). These cost ratios are assumed to be the same for both integrated and independent companies.

lease bonus and geological costs are assumed to be associated with properties that turn out to be worthless. Eighty percent of production is assumed to be produced by integrated and large independent companies; the remainder is produced by small independent companies. It is also assumed that the economic depreciation (depletion) rate for the oil industry is 10 percent. In calculating the user cost of capital for the oil industry, it is assumed that the initial output price remains fixed and that the bonus (mineral acquisition costs) adjusts to maintain the required after-tax return.

User Costs and Effective Tax Rates Under Alternative Tax Reform Proposals

Previous CBO reports have illustrated how effective tax rates on corporate investments differ among industries, and how effective tax rates would be altered by the President's tax reform proposals.^{61/} The estimates of effective tax rates for particular industry groups shown below are comparable to those in earlier reports, but are not exactly the same because of different assumptions about the real discount rate and expected inflation. In addition, earlier reports did not show the effective tax rate on the return to investments (including land acquisition costs and intangible drilling costs) in oil and gas extraction.

Current Law. Table 8 presents estimates of the user cost of capital and effective tax rates for eight broad industry classes, including oil and gas extraction, under current law. The assets included in each industry are limited to depreciable (and depletable) assets and inventories; other assets such as land, patent rights, or working capital have been excluded. These calculations reflect an assumed required real return of 8 percent, an expected inflation rate of 4 percent, and full use of credits and depreciation deductions on a current basis.^{62/} The effective tax

61. See Congressional Budget Office, Revising the Corporate Income Tax, Chapter IV (May 1985), and Congressional Budget Office, Effective Tax Rates and Real Costs of Capital Under Current Law and Under the President's Proposed Tax Reform, Staff Working Paper (August 1985):

62. These tax rates are relatively insensitive to the assumed real rate of return. (The tax rates in Table 8 are replicated in the Appendix under an assumed real rate of 5 percent.) However, the effective tax rates under current law are especially sensitive to the assumption of the 4 percent expected inflation. (This assumption is consistent with CBO's latest economic forecast.) At higher expected infla-

rate refers only to the corporate-level tax and does not include any tax effects at the personal level on capital gains or dividends. Furthermore, the windfall profit tax is assumed to be zero since it is effectively zero on newly discovered oil.^{63/}

The overall tax rate of the oil and gas industry is about 10 percent, about 19 percentage points lower than the average for industries other than oil and gas extraction.^{64/} The oil and gas tax rate reflects an effective tax rate on integrated companies of 14 percent and an effective rate of -10 percent on independent companies.^{65/} Industries that use relatively more assets eligible for the investment tax credit, such as transportation or communications, generally have relatively low tax rates. Others that rely more heavily on inventories and buildings and structures (not eligible for the investment tax credit), such as wholesale and retail trade, have higher tax rates.

The effective tax rates measured here differ significantly from average "cash-flow" tax rates based on company financial reports.^{66/} A cash-flow tax rate is limited to one year's taxes and income and includes the full range of a company's operations. (In the case of oil and gas, it might include refining and retailing operations.) In addition, a cash-flow rate is an average of all the company's investments--new and old alike. In any given year, a cash-flow tax rate is likely to depend on the timing of a firm's investments and other economic conditions that may be specific to that particular year (for example, whether oil prices are going up or down). By contrast, the effective marginal tax rate used in this study pertains only to potential future investments and covers their full expected life. Because of these

tion, tax rates rise under current law, but remain virtually unchanged under Treasury I and the President's proposal because of their provisions for indexing for inflation.

63. Since the effective tax rate calculations only apply to marginal investments, this treatment is appropriate.
64. The Appendix provides sensitivity analysis results for an assumed real return of 5 percent. In this case, the differential is 17 percentage points.
65. A negative rate implies that the present value of taxes is less than zero--that is, the industry receives a net refund. It also implies that the pretax rate of return is less than the after-tax rate of return.
66. For example, see Joint Committee on Taxation, Study of 1983 Effective Tax Rates of Selected Large U.S. Corporations (November 28, 1984).

TABLE 8. EFFECTIVE TAX RATES AND REAL USER COSTS
OF CAPITAL UNDER CURRENT LAW
AND REFORM PROPOSALS (In percents)

Industry	Real User Cost of Capital	Required Pretax Return	Effective Tax Rate
<u>Current Law</u>			
Manufacturing	20.8	11.9	33
Construction	23.6	11.6	31
Transportation	17.7	9.8	18
Communications	16.8	9.3	14
Public Utilities	15.7	10.2	22
Wholesale and Retail Trade	21.8	12.8	38
Services	20.2	10.3	22
Average Rate	19.4	11.2	29
Oil and Gas Extraction	18.9	8.8	10
<u>Treasury Proposal</u>			
Manufacturing	20.6	11.7	32
Construction	23.7	11.7	32
Transportation	19.3	11.4	30
Communications	18.6	11.1	28
Public Utilities	17.3	11.8	32
Wholesale and Retail Trade	20.7	11.7	32
Services	21.5	11.6	31
Average Rate	19.9	11.7	32
Oil and Gas Extraction	20.7	10.7	25
<u>President's Proposals</u>			
Manufacturing	19.9	11.0	27
Construction	22.8	10.8	26
Transportation	17.9	10.0	20
Communications	17.1	9.7	18
Public Utilities	15.1	9.6	17
Wholesale and Retail Trade	20.2	11.2	29
Services	20.1	10.2	21
Average Rate	20.1	10.5	24
Oil and Gas Extraction	18.7	8.3	8

SOURCE: Congressional Budget Office.

NOTE: Tax rates are computed under the assumptions that financing is 100 percent equity and all deductions and credits can be taken on a current basis. The real required return is assumed to be 8 percent; expected inflation is assumed to be 4 percent. The taxpayer is a corporation with a marginal tax rate equal to the top corporate tax rate. Taxes paid by individual shareholders on dividends and on capital gains are not counted in the calculation. The tax rate is the corporate income tax rate only.

